

**What is claimed is:**

1           1.    An input/output controller connected to a  
2   control module and a terminal device, comprising:

3           a first port connected to the control module;

4           a second port connected to the terminal device;

5           a memory for saving data from the first port and the  
6           second port; and

7           a mode-selecting circuit, including a plurality of  
8           preset operation modes, which determine the  
9           input or output type of the first port and the  
10          second port, data-transmitting formats used by  
11          the first and second port, and data-saving  
12          formats used in the memory.

1           2.    The input/output controller as claimed in claim  
2   1, further comprising a superior serial port and an  
3   inferior serial port to connect another two input/output  
4   controllers in serial.

1           3.    The input/output controller as claimed in claim  
2   1, further comprising a scan port, when the mode-  
3   selecting circuit is in a scan output mode, data saved in  
4   the memory is transmitted to the terminal device through  
5   the second port cooperating with the scan port.

1           4.    The input/output controller as claimed in claim  
2   3, wherein when the mode-selecting circuit is in a scan  
3   input mode, data in the terminal device is read through  
4   the second port cooperating with the scan port and saved  
5   in the memory.



1           5.    The input/output controller as claimed in claim  
2    1, further comprising an analog-to-digital data port,  
3    when the mode-selecting circuit is in an analog input  
4    mode, data in the terminal device is read through the  
5    analog-to-digital data port and saved in the memory.

1           6.    The input/output controller as claimed in claim  
2    1, further comprising a digital-to-analog data port, when  
3    the mode-selecting circuit is in an analog output mode,  
4    data saved in the memory is transmitted to the terminal  
5    device through the digital-to-analog data port.

1           7.    An extension unit for a programmable logic  
2    controller, comprising:

3           a terminal device;

4           an input/output controller, comprising:

5               a first port connected to the programmable  
6               logic controller;

7               a second port connected to the terminal device;

8               a memory for saving data from the first port  
9               and the second port; and

10           a mode-selecting circuit, including a plurality  
11           of preset operation modes, which  
12           determines input or output type of the  
13           first port and the second port, data-  
14           transmitting format used by the first and  
15           second port, and data-saving format used  
16           in the memory.

1           8.    The extension unit as claimed in claim 7,  
2    further comprising a superior serial port and an inferior



3 serial port to connect another two input/output  
4 controllers in serial.

1 9. The extension unit as claimed in claim 7,  
2 further comprising a scan port, when the mode-selecting  
3 circuit is in a scan output mode, data saved in the  
4 memory is transmitted to the terminal device through the  
5 second port cooperating with the scan port.

1 10. The extension unit as claimed in claim 9,  
2 wherein the terminal device is a display module with a  
3 plurality of binary coded decimal 7-segment LEDs.

1 11. The extension unit as claimed in claim 7,  
2 wherein when the mode-selecting circuit is in a scan  
3 input mode, data in the terminal device is read through  
4 the second port cooperating with the scan port and saved  
5 in the memory.

1 12. The extension unit as claimed in claim 11,  
2 wherein the terminal device is a keyboard.

1 13. The extension unit as claimed in claim 11,  
2 wherein the terminal device is a display module with a  
3 plurality of binary coded decimal LED displays.

1 14. The extension unit as claimed in claim 7,  
2 further comprising an analog-to-digital data port, when  
3 the mode-selecting circuit is in an analog input mode,  
4 data in the terminal device is read through the analog-  
5 to-digital data port and saved in the memory.



1           15. The extension unit as claimed in claim 14,  
2 wherein the terminal device is a thermometer.

1           16. The extension unit as claimed in claim 7,  
2 further comprising a digital-to-analog data port, when  
3 the mode-selecting circuit is in an analog output mode,  
4 data saved in the memory is transmitted to the terminal  
5 device through the digital-to-analog data port.

1           17. The extension unit as claimed in claim 16,  
2 wherein the terminal device is a heater.